

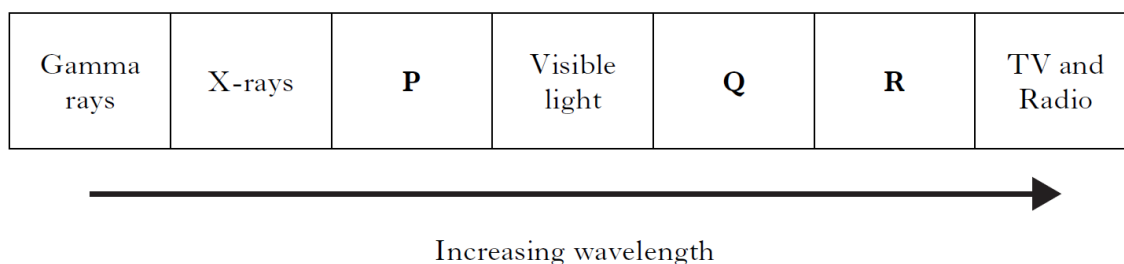
National 5 Physics



St Kentigern's Academy

**DS and WR Integrated
Identified Past Paper Questions**

1. All stars emit electromagnetic radiation. The diagram below shows the electromagnetic spectrum in order of increasing wavelength. The names of **three** of the radiations are missing.



- (a) (i) Name radiations P, Q and R. 2
- (ii) Which radiation in the electromagnetic spectrum has the lowest frequency? 1
- (b) Some spectral lines of radiation from a distant star are shown below.



Spectral lines of radiation from distant star

The spectral lines of a number of elements are also shown.

Cadmium



Calcium



Krypton

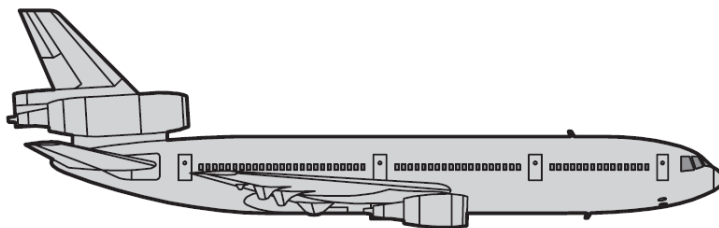


Mercury

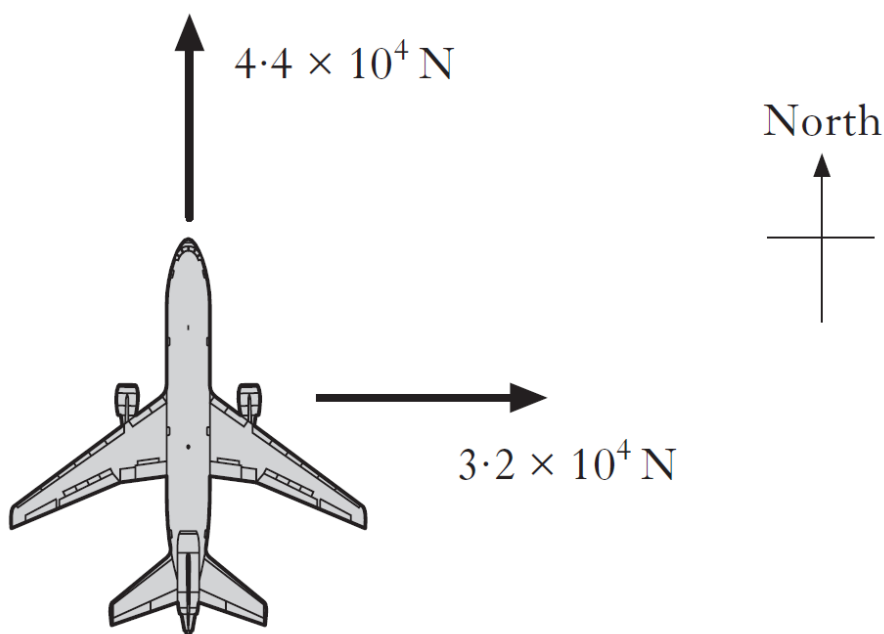


Use the spectral lines of the elements shown above to identify which of these elements are present in the distant star.

2. An aircraft is flying horizontally at a constant speed.

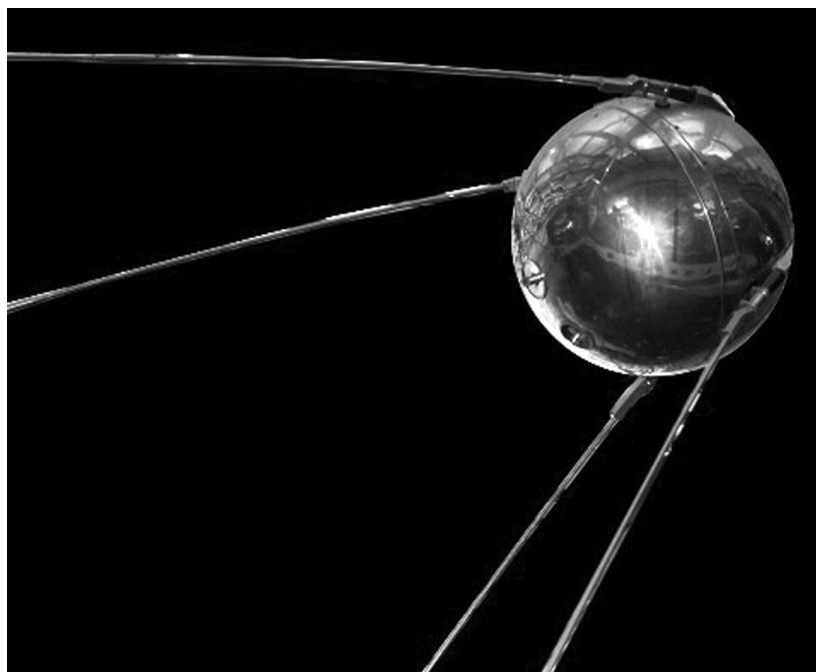


- (a) The aircraft and passengers have a total mass of 50 000 kg. Calculate the total weight. 3
- (b) State the magnitude of the upward force acting on the aircraft. 1
- (c) During the flight, the aircraft's engines produce a force of 4.4×10^4 N due North. The aircraft encounters a crosswind, blowing from west to east, which exerts a force of 3.2×10^4 N.



- Calculate the resultant force on the aircraft. 4
- (d) During a particular flight, a pilot receives an absorbed dose of 15 μ Gy from gamma rays. Calculate the equivalent dose received due to this type of radiation. 3
- (e) Gamma radiation is an example of radiation which causes *ionisation*. Explain what is meant by the term *ionisation*. 1

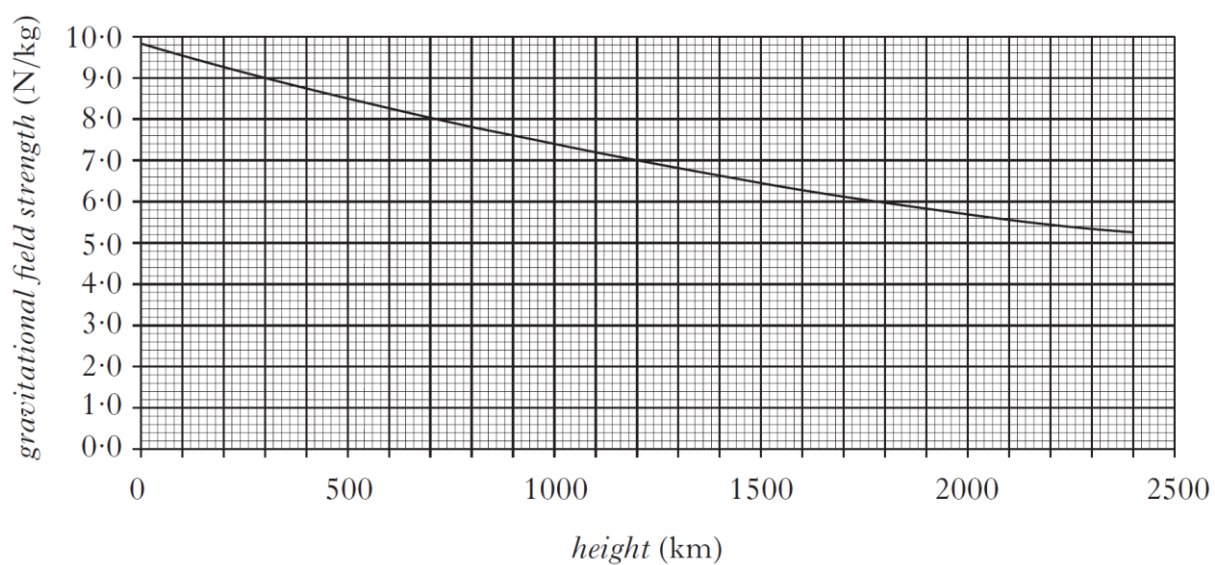
3. Sputnik 1, the first man-made satellite, was launched in 1957. It orbited the Earth at a speed of 8300 m s^{-1} and had a mass of 84 kg.



- (a) (i) Sputnik 1 orbited Earth in 100 minutes.
Calculate the distance it travelled in this time. 3
- (ii) Although Sputnik 1 travelled at a constant speed in a circular orbit, it accelerated continuously.
Explain this statement. 2
- (b) Sputnik 1 transmitted radio signals a distance of 800 km to the surface of the Earth.
Calculate the time taken for the signals to reach the Earth's surface. 3

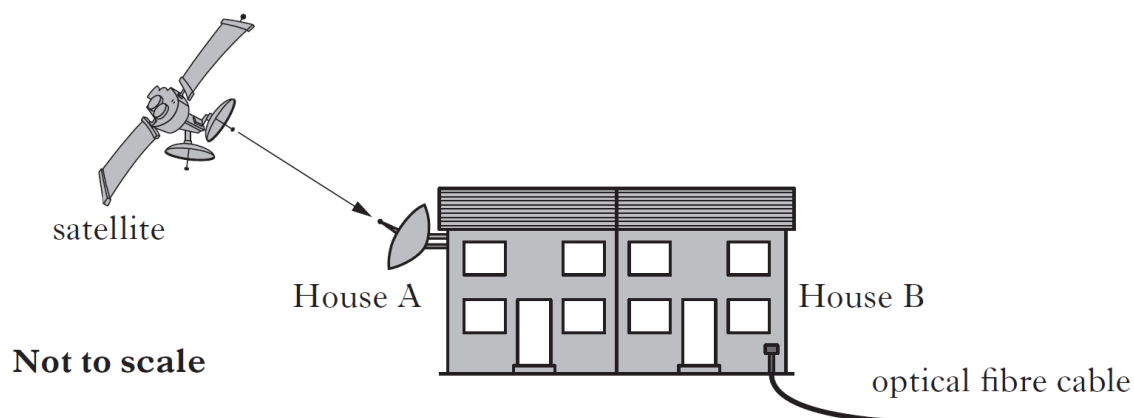
3. (continued)

- (c) The graph shows how gravitational field strength varies with height above the surface of the Earth.



- (i) Define the term *gravitational field strength*. 1
- (ii) What is the value of the gravitational field strength at a height of 800 km? 1
- (iii) Calculate the weight of Sputnik 1 at this height. 3

4. Two next door neighbours are watching a football match on television. The event is being broadcast live. Signals are sent at the same time to a geostationary satellite and to an optical fibre system. House A receives the television signal from the satellite while House B receives the signal, carried in the form of light, through an optical fibre cable made from glass.

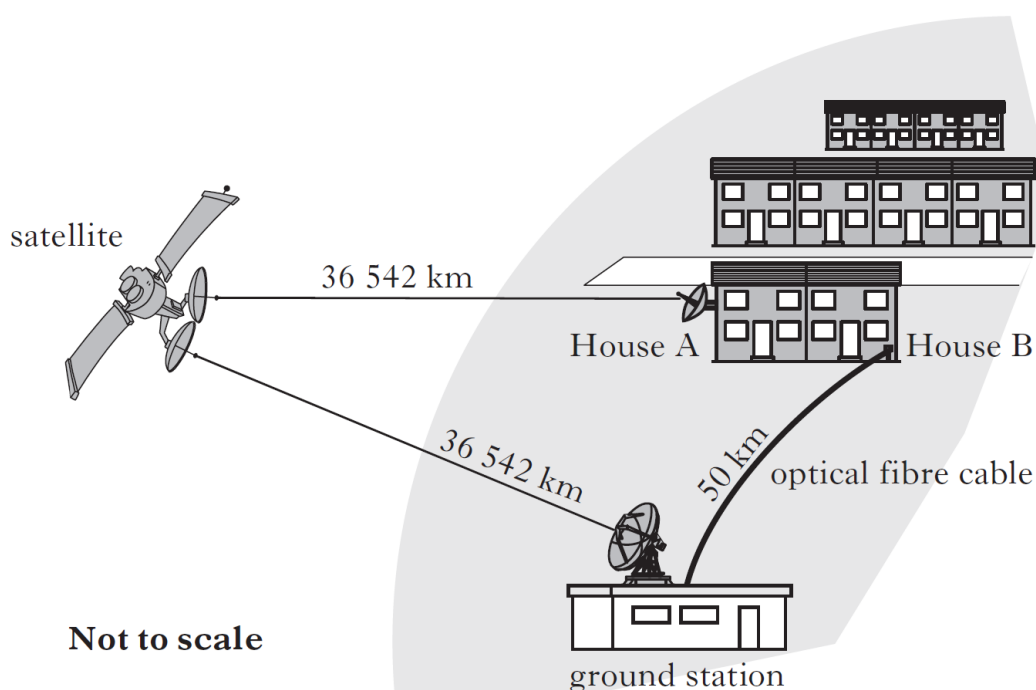


- (a) Complete the table below by entering the speed of each signal.

2

| Signal | Transmitted speed in ms^{-1} |
|---------------|---------------------------------------|
| Satellite | |
| Optical Fibre | |

- (b) The distance travelled by each signal is shown on the diagram.



One neighbour hears cheering from the house next door before seeing a goal being scored.
Calculate the time delay between hearing the cheer and seeing the goal being scored.

3

Sources

| <u>Question</u> | <u>Source</u> |
|-----------------|--|
| 1 | SG - Credit - 2011 - Q14 |
| 2 | I2 - 2011 - Q23 |
| 3 | I2 - 2012 - Q21 |
| 4 | SG - Credit - 2013 - Q1 (c) & (d) [STEM AMENDED] |